

WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device, characterized in comprising:
  - a step of forming opening sections in a semiconductor substrate;
  - a step of forming embedded electrodes inside the opening sections; and
  - a step of spin etching the semiconductor substrate from a back surface of a surface of the semiconductor substrate where the opening sections are formed, to thereby thin down the semiconductor substrate and make the opening sections penetrate the semiconductor substrate.
2. A method for manufacturing a semiconductor device according to claim 1, characterized in further comprising:
  - a step of forming dielectric films inside the opening sections before the step of forming the embedded electrodes inside the opening sections; and
  - a step of exposing at least one part of the dielectric films in the step of making the opening sections penetrate the semiconductor substrate.
3. A method for manufacturing a semiconductor device according to claim 2, characterized in further comprising a step of removing the dielectric films before the step of making the opening sections penetrate the semiconductor substrate to expose the embedded electrodes.
4. A method for manufacturing a semiconductor device according to claim 1, characterized in further comprising a step of grinding the semiconductor substrate from the back surface thereof before the step of making the opening sections penetrate the semiconductor substrate.
5. A method for manufacturing a semiconductor device according to claim 1, characterized in that, in the step of making the opening sections penetrate the semiconductor substrate, an etching rate for the semiconductor substrate changes with time.
6. A method for manufacturing a semiconductor device according to claim 1, characterized in that, in the step of making the opening sections penetrate the semiconductor substrate, the etching rate for the semiconductor substrate changes from a first etching rate to a second etching rate that is lower than the first etching rate.
7. A method for manufacturing a semiconductor device according to claim 3, characterized in that, in the step of exposing the embedded electrodes, the dielectric films are removed by grinding the dielectric films exposed.

8. A method for manufacturing a semiconductor device according to claim 1, characterized in further comprising a step of attaching a retaining member on the surface of the semiconductor substrate where the opening sections are formed, before the step of making the opening sections penetrate the semiconductor substrate.

9. A method for manufacturing a semiconductor device according to claim 8, characterized in that the retaining member includes a base member and an adhesive layer provided on a surface of the base member, and the base member is one of a tape, a film, a light-transmissive substrate and another substrate.

10. A method for manufacturing a semiconductor module, characterized in comprising:

a step of forming opening sections in a first semiconductor substrate;

a step of forming embedded electrodes inside the opening sections;

a step of spin etching the semiconductor substrate from a back surface of a surface of the semiconductor substrate where the opening sections are formed, to thereby thin down the semiconductor substrate and make the opening sections penetrate the semiconductor substrate; and

a step of mounting the first semiconductor substrate on a second semiconductor substrate having electrodes, and electrically connecting the embedded electrodes and the electrodes.